We know that a number of non-phosphorescent bodies emit rays of light after having been under the influence of the latter. The duration of this condition is from a few minutes to twenty-four hours. Metals like steel and iron are non-phosphorescent, but we have here a new form of this phenomenon, dark phosphorescence. It is the light, and not the heat which produces the effect named upon the metals; the color of the rays does not seem to have any power to produce in the metals the effect described above. Zinc becomes active by heating alone; when experimenting with this body, Elfving found that it acts as a positive thermotropic agent. On copper, cobalt, nickel, tin, lead, and glass, heating (as above) alone did not produce the activity, although these metals and the glass were heated until they were nearly melting, and then allowed to cool so far that the hand could not feel the heat.

Elfving concludes: "Es scheint mir dann wenig befremdend anzunehmen, dass auch Molekularschwingungen, welche den Körpern selbst innewohnen, oder irgend eine in denselben stattfindende Veränderung begleiten, ähnliche physiologische Wirkungen hervorrufen können. Was speciell die Metalle betrifft, zeigt uns ja auch die Metallotherapie Wirkungen, die entschieden für solche sprechen."—J. CHRISTIAN BAY.

## Color bodies in seeds and seedlings.[2]

In this paper Famintzin gives the results of his investigations on the origin of chlorophyll in plants, a subject concerning which there is much uncertainty and difference of opinion, as may be seen in the fact that Bredow and Belzung who studied this question came to diametrically opposite conclusions.

Famintzin's attention was directed principally to the ripe seeds of Helianthus. Microtome sections were placed in Helianthus oil, whereby colorless choromatophores, 1.5–2.5$\mu$ in diameter, were distinguished without further treatment, although their presence was more easily discernible when the sections had been slightly moistened with the breath. The chromatophores are situated partly in the spaces between the aleurone grains and partly on the surface of the latter and upon the cell nucleus.

[2] FAMINTZIN, A. Ueber das Schicksal der Chlorophyllkörner in Samen und Keimlingen, 16 pp., 1 plate. Arbeiten des botanischen Laboratoriums der Akadamie, St. Petersburg, 1893. No. 5. Abst. in Botan. Centralbl. **58:** 378–9. 1894.

Their presence in all of the embryo cells may be demonstrated by treating the embryo with acid fuchsin, the chromatophores and a thin layer of plasma surrounding the aleurone grains taking the stain. This demonstration is facilitated by previously treating the sections with acetic acid which causes the aleurone grains to swell and finally to dissolve.

The swelling of the aleurone grains take place normally in the early stages of germination, producing a similar effect as when treated with acetic acid.

The chromatophores are frequently found closely pressed together in groups of considerable size which are liable to be mistaken for single bodies.

In germinating seeds the colorless chromatophores may be easily made out by the acid fuchsin stain. The author discovered a further means of distinguishing them in resting as well as germinating seeds by the use of ammonia, an alkali, or alkaline carbonate. The chromatophores were found to contain chromogen which, by means of these reagents, was transformed into a golden-yellow pigment. If thin sections of the Helianthus seeds are placed in a moist chamber with access of air, the chromatophores, owing to the presence of chromogen, become spontaneously colored, taking on at first a bluish-green, and later a yellowish-brown tint.

A comparison of sections of ripe seeds with those of seedlings of different ages, including those containing chlorophyll-green chromatophores, showed all stages of transformation so that it is not to be doubted that the chlorophyll grains of the seedling arise from the colorless chromatophores of the seed. This result was confirmed by a study of the seeds of Lupinus albo-coccineus.

A later and shorter paper by Famintzin discusses the chromogen of Helianthus seeds. At present the author is engaged in a study of the relations of this pigment to xanthophyll and chlorophyll, both of which are probably derived from chromogen in the process of germination. Unfortunately the original papers are in Russian, hence inaccessible to the majority of scientific readers.—G. H. HICKS.